

### **REMARKS**

In the Action, claims 1, 3, 5, 7, 9, 11, 13, 14, 16, 17 and 19-21 are rejected. In response, claims 1 and 13 are amended, claim 20 is cancelled, and new claims 21-24 are added. Thus, the pending claims in this application are claims 1, 3, 5, 7, 9, 11, 13, 14, 16, 17, 19, 21 and 22-24, with claims 1 and 13 being independent. In view of these amendments and the following comments, reconsideration and allowance are requested.

#### **Rejection Under 35 U.S.C. § 112**

Claims 13, 14, 16, 19 and 21 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly not being supported by the written description of the invention. The Action contends that the application as originally filed does not support the limitation of the clay dispersibility in high-hardness water of “not less than 0.47”. Although Applicants disagree with this conclusion, claim 13 is amended to recite the clay dispersibility having a value of 0.47 to 0.60. As noted in the Action, Table 1 on page 48 of the specification discloses the polymers of the claimed invention having a clay dispersibility ranging from 0.47 to 0.60. Accordingly, Applicants submit that claim 13 as amended is fully supported by the specification and the Examples as originally filed. Applicants request this rejection be withdrawn.

#### **Rejection Under 35 U.S.C. § 102(e)**

Claims 1, 3, 5, 7, 9, 11, 13, 14, 16, 17, 19 and 21 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,444,771 to Yamaguchi et al. Yamaguchi et al. is cited for disclosing an acrylic acid-maleic acid copolymer having a specified molecular weight, calcium ion scavengeability and clay dispersibility. For the reasons discussed below,

Yamaguchi et al. does not disclose or suggest the claimed process or polymer so that the claims are not anticipated.

Claim 1, as amended, is directed to a process for producing a (meth)acrylic acid (salt)-based polymer by polymerizing a monomer component in the presence of a persulfate salt and hydrogen peroxide as polymerization catalysts and in the presence of an alkaline substance to neutralize not more than 99 mol% of the acid groups of the monomer component and where the dropwise addition of the hydrogen peroxide is completed at least 10 minutes earlier than the completion of the dropwise addition of the monomer component. Claim 1 is amended to include the subject matter of claim 20 and recites that not less than 70 weight% of the monomers A and B are added in a continuous dropwise addition to the reaction mixture. Yamaguchi et al. does not disclose or suggest the combination of the process steps as claimed.

Yamaguchi et al. does not disclose a process of polymerizing a monomer component where 100 to 95 mol% of the monomer component is a monoethylenically unsaturated monocarboxylic acid salt monomer A having 3 to 6 carbon atoms as claimed. Yamaguchi et al. also fails to disclose the monomer component comprising 0 to 5 mol% of a monoethylenically unsaturated monomer B. As noted in the Action, Yamaguchi et al. discloses a polymerization process between acrylic acid and maleic acid to produce a copolymer. As disclosed in column 6, lines 22-32 of Yamaguchi et al., the ratio between the acrylic acid and maleic acid is in the range of 30/70 to 70/30, and most preferably 40/60 to 60/40. More specifically, Yamaguchi et al. discloses that when the ratio of acrylic acid to maleic acid exceeds 70/30, the resulting magnesium ion scavengeability and the clay dispersibility in the presence of magnesium ion are low. Thus, Yamaguchi et al. specifically teaches a monomer component containing 70 mol% or less acrylic acid and effectively

teaches away from the claimed amount of the claimed monomer A. Thus, Yamaguchi et al. does not disclose the claimed ratio of the monomer A and the monomer B. Furthermore, Yamaguchi et al. discourages the use of more than 70 mol% in the monomer component to avoid the poor qualities of the resulting copolymer in terms of magnesium ion scavengeability and clay dispersibility in the presence of magnesium ion.

Yamaguchi et al. also fails to disclose the claimed process of adding the monomer A and monomer B to the reaction system where not less than 70 weight% of the monomer A and monomer B are added in a continuous dropwise addition. As discussed on page 12 of the specification, the initial charge of the monomers A and B to the reaction system is less than 30 weight% of the entire weight of the monomer components. Thus, at least 70 weight% of the monomer components A and B are added in a dropwise manner in the claimed invention.

More specifically, Yamaguchi et al. does not disclose or suggest adding the maleic acid to the reaction mixture where not less than 70 weight% is added in a dropwise manner. Column 5, lines 18-28 specifically disclose that 50 weight% or more of the maleic acid is initially charged into the reaction mixture. Yamaguchi et al. further discloses that preferably 80 weight% and most preferably 100 weight% of the entire amount of the maleic acid is initially charged to the reaction mixture. In the Examples of Yamaguchi et al., the entire amount of the maleic acid is initially charged into the reaction mixture. Thus, Yamaguchi et al. does not disclose or suggest adding a monomer component B in a dropwise manner where not less than 70 weight% of the monomer B is added in a dropwise manner as claimed.

As discussed on page 12 of the specification, the dropwise addition of the monomers A and B is important in obtaining the desired properties in the resulting polymer. In particular, the amount of the monomers A and B added by the dropwise addition have a direct effect on the calcium ion scavengeability, clay dispersibility in high-hardness water and scale

inhibitability. It has been found that when the initial charge of the monomers A and B added to the reaction system is greater than 30 weight%, the monomers polymerize into a block form which result in poor calcium ion scavengeability, clay dispersibility in high-hardness water, and clay inhibitability. Thus, adding not less than 70 mol% to the reaction mixture by the dropwise addition is important in obtaining polymers having the high clay dispersibility in high-hardness water. Yamaguchi et al. does not recognize this feature of the invention. In contrast, Yamaguchi et al. provides an initial charge of the maleic acid in an amount of at least 50 weight% of the total amount to be added to the reaction system. Yamaguchi et al. clearly fails to disclose or suggest the advantages of adding not less than 70 weight% of the monomers A and B in a dropwise manner to the reaction system as claimed.

In view of the above distinctions, claim 1 is not anticipated by Yamaguchi et al. The claims depending from claim 1 are also not anticipated for reciting additional features of the invention that are not disclosed or suggested in combination with the process steps of claim 1. For example, Yamaguchi et al. does not disclose the weight average molecular weight and the final concentration of the resulting polymer as recited in claim 3, the final concentration of the resulting polymer as recited in claim 5, the dispersion degree of claim 7 or the ratio of the persulfate salt and hydrogen peroxide of claim 9 in combination with the process steps of claim 1. Accordingly, claims 3, 5, 7 and 9 are not anticipated by Yamaguchi et al.

Claim 11 depends from claim 1 to recite the low molecular (meth)acrylic acid (salt)-based polymer obtained by the process of claim 1. For the reasons noted above, Yamaguchi et al. does not disclose the claimed process for producing the polymer. Since the process of Yamaguchi et al. is different from the claimed process, the resulting polymers are not the same. Accordingly, claim 11 is not anticipated by Yamaguchi et al.

Independent claim 13 is directed to a low molecular (meth)acrylic acid (salt)-based polymer obtained by polymerizing a monoethylenically unsaturated monocarboxylic acid salt monomer A and a monoethylenically unsaturated monomer B and where the resulting polymer has a weight average molecular weight of 1,000 to 30,000, a dispersion degree of 1.5 to 5 and a clay dispersibility in high-hardness water of 0.47 to 0.60. Claim 13 also recites a 40% aqueous solution of the polymer having a hydrogen peroxide content of 5 to 500 ppm and a hazen value of not more than 300. Yamaguchi et al. does not disclose a polymer having the combination of these claimed features.

In particular, Yamaguchi et al. does not disclose a polymer having a clay dispersibility in high-hardness water in the claimed range of 0.47 to 0.60. As disclosed on page 36 of the specification, the clay dispersibility of the claimed polymer is determined in high-hardness water. In contrast, Yamaguchi et al. discloses the clay dispersibility as measured in a low hardness water such that the values reported in Yamaguchi et al. are not comparable to the values of the claimed invention. Furthermore, the clay dispersibility of the claimed invention is determined from a test sample having a calcium concentration of 200 ppm in terms of calcium carbonate. In contrast, Yamaguchi et al. determines the clay dispersibility in the presence of magnesium ion. See, for example, column 25, line 1 of Yamaguchi et al. The concentration of the test solution of Yamaguchi et al. contains 100 ppm magnesium and thus, in a low hardness water. Thus, the clay dispersibility in the presence of magnesium ion is not the same as the clay dispersibility in high-hardness water as presently claimed.

Accompanying this Amendment is a Declaration under 37 C.F.R. § 1.132. The Declaration presents the test data based on reproducing the examples of Yamaguchi et al. and determining the clay dispersibility in high-hardness water. The test data confirm that the

resulting polymers of Yamaguchi et al. have a very low clay dispersibility in high-hardness water compared to the clay dispersibility of the claimed invention. The data show that the polymers of Yamaguchi et al. have a clay dispersibility in high-hardness water of 0.15 or less. In contrast, the Examples in the specification demonstrate that the resulting polymers according to the invention have a clay dispersibility in high-hardness water of 0.47 or higher. Thus, the polymers of the claimed invention are superior in terms of clay dispersibility in high-hardness water compared to the polymers of Yamaguchi et al.

The data in the Declaration also demonstrate the significance of the claimed process step of adding not less than 70 weight% of the monomers A and B in a continuous dropwise manner to the reaction system. Examples 1-1 to 1-5 of Yamaguchi et al. provide an initial charge of the entire amount of the maleic acid into the reaction system. As set forth in the Declaration, the resulting polymers of Yamaguchi et al. have a very low clay dispersibility in high-hardness water compared to the polymers of the claimed invention.

For the reasons discussed above, the resulting polymer obtained according to the process of claim 1 and the polymer of claim 13 are not disclosed or suggested in Yamaguchi et al. Accordingly, the detergent composition of claims 14 and 16 and the water-treating agent of claims 17 and 19 containing the polymer of claim 1 or claim 13 are not anticipated by Yamaguchi et al. As discussed above, Yamaguchi et al. does not disclose the claimed process step of adding the monomer A and monomer B to the reaction system where not less than 70 weight% of the monomers A and B are added in a continuous dropwise addition as in claim 21, which depends from claim 13. Accordingly, claim 21 is not anticipated by Yamaguchi et al.

In view of these amendments and the above comments, the claims are submitted to be in condition for allowance. In addition, new claims 22-24 are also submitted to be allowable

over the art of record. For the reasons discussed above, Yamaguchi et al. does not disclose a process for producing a (meth)acrylic acid (salt)-based polymer having a clay dispersibility in high-hardness water of 0.47 to 0.60 as in claim 22, in combination with the process steps of claim 1. Yamaguchi et al. also fails to disclose the polymer having a clay dispersibility in high-hardness water where the clay dispersibility is determined from a test solution having a calcium concentration of 200 ppm in terms of calcium carbonate as in claims 23 and 24, which depend from claims 22 and 13, respectively. Accordingly, claims 22-24 are in condition for allowance.

In view of the above comments, Applicants respectfully request the rejection be withdrawn.

#### **Obviousness-Type Double Patenting Rejection**

Claims 11, 13, 14, 16, 17, 19 and 21 are rejected under the judicially-created doctrine of obviousness-type double patenting over claims 1-15 of U.S. Patent No. 6,444,771 to Yamaguchi et al. Applicants respectfully disagree and request this rejection be withdrawn. Independent claim 1 of Yamaguchi et al. is directed to an acrylic acid-maleic acid copolymer having a magnesium ion scavengeability in terms of magnesium hydroxide per gram and a magnesium scale inhibitability. For the reasons discussed above, the resulting polymers of the claimed invention are produced by a different process from the process disclosed in Yamaguchi et al. and possess different properties from the copolymer of Yamaguchi et al. The Action does not provide any basis for the position that the resulting polymer of the claimed invention is an obvious variation of the copolymer of Yamaguchi et al. Applicants' claims do not recite a magnesium ion scavengeability or a magnesium scale inhibitability. Moreover, Yamaguchi et al. does not disclose or suggest a clay dispersibility in high-

hardness water within the claimed range recited in claim 13. Furthermore, the data presented in the Declaration demonstrate that the copolymers of Yamaguchi et al. do not have the claimed clay dispersibility in high-hardness water. Accordingly, the resulting polymer of the claimed invention is not an obvious variation of the polymer of Yamaguchi et al. Applicants request the obviousness-type double patenting rejection be withdrawn.

In view of the above comments, reconsideration and allowance are requested.

Respectfully submitted,



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